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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,426	09/12/2003	Jen Sheen	00786/397003	9364

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EXAMINER	
KUBELIK, ANNE R	
ART UNIT	**PAPER NUMBER**
1638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/661,426	SHEEN ET AL.	
	Examiner	Art Unit	
	Anne R. Kubelik	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,4 and 6-40* is/are pending in the application.

4a) Of the above claim(s) *8 and 11-40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 February 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 3-4, and 6-40 are pending.

2. This application contains claims 8 and 11-40 drawn to an invention nonelected with traverse in the response filed 30 May 2006. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144). See MPEP § 821.01.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. The rejection of claims 1-2, 6 and 9-10 under 35 U.S.C. 102(a) as being anticipated by Yang et al (2001, Proc. Natl. Acad. Sci. 98:741-746) is withdrawn in light of Applicant's amendment of the claims.

5. The rejection of claims 1-2, 6-7 and 9 under 35 U.S.C. 102(e) as being anticipated by Xing et al (US Patent 6,376,747, filed August 1999) is withdrawn in light of Applicant's amendment of the claims.

6. The rejection of claim 10 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Xing et al (US Patent 6,376,747, filed August 1999) is withdrawn in light of Applicant's amendment of the claims.

7. Figures 15-16 remain objected to because tables and sequence listings that are included in the specification are, except for applications filed under 35 U.S.C. 371, are not permitted to be included in the drawings. See 37 CFR 1.83 (a).

Applicant, in arguments filed 27 February 2006, urges that Figs 15 and 16 are not sequence listings and do not appear in the specification, but depict promoter fragments (response pg 10).

This is not found persuasive because the sequences in Fig 15 and 16 appear in the sequence listing, which is part of the specification. Under 37 CFR 1.83 (a) sequence listings that are included in the specification are not permitted to be included in the drawings.

8. Figures 4-7 filed 27 February 2006 are objected to because letters under the black boxes cannot be read. Submission of replacement figures did not address this issue for these figures. The color drawing of Fig 21 is accepted.

ANNE MARIE GRUNBERG
SUPERVISORY PATENT EXAMINER

Claim Rejections - 35 USC § 112

9. Claims 1, 3-4, 6-7 and 9-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding constitutively activated *Arabidopsis* MKK4, does not reasonably provide enablement for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. The rejection is repeated for the reasons of record as set forth in the Office action mailed 23 August 2006, as applied to claims 1-7 and 9-10. Applicant's arguments filed 27 February 2006 have been fully considered but they are not persuasive.

The claims are broadly drawn to a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain.

The instant specification, however, only provides guidance for induction of defense gene promoters/luciferase constructs in *Arabidopsis* protoplasts by Flg22, the first 22 amino acids of eubacterial flagellins (example 2); analysis of WRKY29 induction in thee protoplasts (example 3); analysis of the effect of constitutively active ANP1 and MEKK1 (both MAPKKKs) on PAL1, GST1 and WRKY29 promoters (example 4); analysis of the effect of constitutively active MKK4 and MKK5 (both MAPKKs) on PAL1 and WRKY29 promoters (example 5); analysis of the transcriptional control of the WRKY29 promoter to show that WRKY29 induces its own expression (example 6), *Arabidopsis* leaves transiently expressing WRKY29 have reduced Pseudomonas susceptibility (example 7); analysis of early defense transcription by flg22 in *Arabidopsis* leaf cells (example 8); determination that flg22 acts through fls2 (example 9); transient expression of mouse MAPK phosphatase to partially block WRKY29 and FRK1 promoter activation, and treatment of protoplasts with flg22 to identify protein kinases activated in *Arabidopsis* - MPK3 and MPK6 were activated but not others (example 10), analyses of 4 of the 9 *Arabidopsis* MAPKKs to determine that constitutively activated MKK4 and MKK5, but not constitutively activated MKK1 and MKK2, are able to phosphorylate and activate MPK3 and MPK6 in a transient expression assay and that constitutively activated MKK4 and MKK5 also activate the WRKY29 and FRK1 promoters, but not the GST1 promoter (example 11); analysis of 4 of the 25 *Arabidopsis* MAPKKKs to determine that constitutively activated MEKK1 but not constitutively activated CTR1 and EDR1 activate MKK5 and that constitutively activated ANP1 activated it only marginally (example 12); determination that WRKY regulates its own promoter

(example 13); and leaves expressing constitutively activated MEKK1, MKK4, MKK5 or wild-type WRKY29 had enhanced resistance to Pseudomonas and Botrytis (example 14). prophetic guidance is given for isolation of other MAPKKKs, MAPKKs and WRKYs and expression of the proteins or their kinase domains in plants (pg 33-48).

The instant specification fails to provide guidance for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain

Not all MAPKKs will function in the claimed invention. The specification teaches that half of the four tested MAPKKs did not function to activate pathogen resistance genes (example 11). Matsuoka et al (2002, Plant J. 29:637-647) teach that the Arabidopsis MAPKK AtMEK1 has a distinct substrate specificity and only poorly activated MPK3 (paragraph spanning pg 640-641).

Nucleic acid encoding MAPKKs that are not constitutively activated will not function in the claimed invention. Xing et al (2001, Plant Mol. Biol. 46:109-120) teach that the non-constitutively activated form of the MAPKK, tMEK2, did not activate pathogenesis genes (pg 144, left column, paragraph 2). Further, the specification states "MAPKKs require phosphorylation to be activated" (pg 24, lines 10-11).

Nucleic acids encoding only the kinase domain of a MAPKK are unlikely to work in the claimed invention, as regions outside the kinase domain are involved in MAPK binding (Fukuda et al, 1997, EMBO J. 16:1901-1908).

Lastly, nucleic acids encoding non-plant MAPKKs are unlikely to work in the claimed invention, given the substrate specificity of MAPKKs.

Given the claim breath, unpredictability in the art, undue experimentation, and lack of guidance in the specification as discussed above, the instant invention is not enabled throughout the full scope of the claims.

Applicant urges that there can be no question that claim 7 is enabled as MKK4 is presented in the specification (response pg 11).

This is not found persuasive because nucleic acids encoding only the kinase domain of a MAPKK, including that of MKK4, are unlikely to work in the claimed invention, as regions outside the kinase domain are involved in MAPK binding (Fukuda et al, 1997, EMBO J. 16:1901-1908).

Applicant urges that all the tools for expressing MAPKK DNAs were known when the application was filed and routine experimentation is permitted (response pg 11-13).

This is not found persuasive because nucleic acids encoding only the kinase domain of a MAPKK are unlikely to work in the claimed invention. Further, not all MAPKKs will function in the claimed invention. The specification teaches that 50% of the four tested MAPKKs did not function to activate pathogen resistance genes (example 11). There is no reason to expect that any measure of routine experimentation would make the nonfunctional MAPKKs work.

10. Claims 1, 3-4, 6-7 and 9-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The rejection is repeated for the reasons of record as set forth in the Office

action mailed 23 August 2006, as applied to claims 1-7 and 9-10. Applicant's arguments filed 27 February 2006 have been fully considered but they are not persuasive.

A full review of the specification indicates that nucleic acids encoding MAPKK domains that enhance resistance of plants to pathogens are essential to the operation of the claimed invention. The claims, however, are drawn to methods comprising transforming plants with nucleic acids encoding any MAPKK domain.

The level of skill and knowledge in the art at the time of filing was such that a number of MAPKKs were known, but only two of these have been shown to enhance resistance of plants to pathogens.

The specification describes no structural feature that distinguishes MAPKKs that enhance resistance of plants to pathogens from those that do not. The necessary and sufficient structural elements of a MAPKK that enhances resistance of plants to pathogens are not described.

The only species described in the specification are MKK4 and MKK5.

Since the disclosure fails to describe the common attributes that identify members of the genus, and because the genus is highly variant, MKK4 and MKK5 are insufficient to describe the claimed genus.

Because the sequences are not described, the method of using the sequences to enhance resistance of plants to pathogens is likewise not described, and the specification fails to provide an adequate written description of the claimed invention.

Therefore, given the lack of written description in the specification with regard to the structural and functional characteristics of the compositions used in the claimed methods, it is

not clear that Applicant was in possession of the claimed genus at the time this application was filed.

Applicant urges that *Falkner* states that a recitation of a sequence is not equired when it is present in the art (response pg 13-14).

This is not found persuasive. The rejection was not that MAPKKs were not described. The rejection was that the structural feature(s) that distinguishes MAPKKs that enhance resistance of plants to pathogens from those that do not is not described. This is necessary because the claimed method requires that the MAPKK enhances resistance of plants to pathogens.

Claim Rejections - 35 USC § 103

11. Claims 1, 3-4, 6-7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xing et al (US Patent 6,376,747, filed August 1999). Due to Applicant's amendment of the claims, the rejection is modified from ht rejection set forth in the Office action mailed 23 August 2006, as applied to claims 1-7 and 9. Applicant's arguments filed 27 February 2006 have been fully considered but they are not persuasive.

The claims are drawn to a method of increasing disease resistance in plants by transformation with a nucleic acid encoding a kinase domain of a MAPKK protein, wherein the plants include crucifers, or to transformation of any plant with a nucleic acid encoding MKK4.

Xing et al teach that tomato plants transformed with a nucleic acid encoding a constitutively active form of the MAPKK tMEK2 are resistant to Pseudomonas syringae pv tomato (column 12, lines 58-63). This nucleic acid would encode a kinase domain of a MAPKK

protein. Xing et al claims a method of increasing disease resistance in a plant by transformation with a nucleic acid encoding a constitutively active form of the MAPKK tMEK2 (claim 5).

Xing et al do not disclose plants transformed with a nucleic acid encoding MKK4 or plants that are crucifers.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify the method of increasing disease resistance in plants as taught by Xing et al, to transform the plants with a nucleic acid encoding MKK4 or to transform a nucleic acid encoding a MAPKK into crucifers. One of ordinary skill in the art would have been motivated to transform the plants with a nucleic acid encoding MKK4 because of the suggestion of Xing et al to do so (column 6, lines 41-51). One of ordinary skill in the art would have been motivated to make pathogen resistant crucifers because of the economic importance of various crucifers, and because of the importance of Arabidopsis as an experimental organism. The MAPPKK would activate the PAL1, GST1, WRKY29 or PR1 promoters (see for example Fig 4), thus activating genes involved in pathogen defense, because this is how MAPKKs that are involved in pathogen defense work (column 1, lines 30-56).

Applicant urges drawing motivation from the level of skill in the art is improper; in *In re Sang Su Lee*, that common knowledge and common sense cannot substitute for authority (response pg 15-16).

This is not found persuasive. First, motivation was drawn from the economic importance of various crucifers and the importance of Arabidopsis as an experimental organism. Further, since the MAPKK worked so well in tomato, it would be obvious to try it in other economically important plants, like crucifers (*e.g.*, *Brassica*). Lastly, The Supreme Court in *KSR International*

Co. v. Teleflex Inc. (82 USPQ2d 1385 at pg 1390) sated "When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense."

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne R. Kubelik, whose telephone number is (571) 272-0801. The examiner can normally be reached Monday through Friday, 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg, can be reached at (571) 272-0975.

The central fax number for official correspondence is (571) 273-8300.

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enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

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Anne Kubelik, Ph.D.
May 14, 2007

ANNE KUBELIK, PH.D.
PRIMARY EXAMINER